**Sea Level Rise**
**NASA Resources for Grades 6- 8**

*6th through 8th grade NGSS related to Sea Level Rise:*

MS-LS2-3. Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.
MS-LS2-4. Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.
MS-LS2-2. Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.
MS-LS2-5. Evaluate competing design solutions for maintaining biodiversity and ecosystem services.
MS-ESS2-2. Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.
MS-ESS2-1. Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process
MS-ESS2-4. Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity.
MS-ESS3-1. Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes.
MS-ESS2-5. Collect data to provide evidence for how the motions and complex interactions of air masses result in changes in weather conditions.
MS-ESS2-6. Develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates.
MS-ESS3-5. Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.
MS-ESS3-2. Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects
MS-ESS3-3. Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.
MS-ESS3-4. Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.
MS-PS4-1. Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave.
MS-PS4-2. Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.
MS-PS4-3. Integrate qualitative scientific and technical information to support the claim that digitized signals are a more reliable way to encode and transmit information than analog signals.
MS-ETS1-1. Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.
MS-ETS1-2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
MS-ETS1-3. Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

# NASA Resources

*Websites:*
NASA's Rising Waters interactive

NASA's Sea Level Rise Portal
Sentinel-6 Mission
NASA's Climate Kids

- Sea Level

NASA's Climate Change and Global Warning

- Sea Level

*Lesson Plans:*
Graphing Sea Level Slopes and Surface Currents
Data Jigsaw: Exploring Sea Level Rise with Others
Stability and Change: Monitoring Sea Level
Creating Your Own Sea Surface Height Model
Connect the Spheres: Earth Systems Interactions
Lessons in Sea Level Rise
Climate Change Inquiry Labs
Climate Change Online Labs
Connect the Spheres: Earth Systems Interactions
Could a World of Swimmers Raise Sea Level?

*Activities:*
ICESat-2 Sea Ice Towers Activity
Earth's Water Globe Activity
16 Years of Ice Loss from Greenland and Antarctica: A Comparison Activity

*Virtual Interactive Activities:*
Sea Level Rise IQuest
Tour of the Electromagnetic Spectrum online book with videos
Floods IQuest
Living in a Freshwater World interactive
Water Cycle IQuest
Weather and Climate IQuest

*Articles:*
*Earth Observatory for Kids*, known as EO Kids, is a NASA affiliated magazine for students, primarily focused on students aged 9 through 14. However, there are many articles and activities in these issues which might be interested and accessible for younger children.

- EO Kids: Making and Melting Ice at Earth's Poles

- EO Kids: Ice on Earth: By Land and By Sea
- EO Kids: Freshwater issue

Water's Family Tree: Where Did Earth's Water Come From? article
Sea Level 101: What Determines the Level of the Sea? blog
Bevy of Biomes learning poster
ICESat-2 Measures the Ice Shelf learning poster

*Videos:*
What is the Greenhouse Effect (2:29)
What Causes Sea Level Rise? (2:43)
Getting the Big Picture (2:39)
Watching Rising Seas from Space (1:58)
The Data Downpour (4:17)
ICESat-2 Atlas Laser Focus (series of videos)
Real World: ICESat-2 and Earth's Cryosphere (5:23)
Watching Rising Seas from Space (1:59)
Sea Level Rise (1:30)

*STEM Career focus video series:*
Meet Dr. Michael Freilich, Inspiration for the Sentinel-6 mission (5:51)
Ben Hamlington, NASA Scientist Studies Sea Level Rise from Space (1:30)
Shannon Statham: From Tuning Antennas to Making Dresses, Engineer Puts the A in STEAM (1:32)
Parag Vaze: NASA Engineer Observes Sea Level Rise from Space for 30 Years (1:34)
Severine Fournier: Science is International" Says French Sea Level Rise NASA Scientist (1:36)
Shailen Desai: NASA Engineer Helps Track the Global Impacts of Rising Seas (1:26)

*Data Visualizations:*
Draining the Oceans
22 Year Sea Level Rise: TOPEX/JASON